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**CONTRACT REQUIREMENTS**

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.        Schedule of values.
- B.        Application for payment.
- C.        Change procedures.
- D.        Alternatives.

**1.2        RELATED SECTIONS**

- A.        Section 01600 - Material and Equipment: Product substitutions.

**1.3        SCHEDULE OF VALUES**

- A.        Submit a printed schedule on Contractor's standard form. Electronic media printout will be considered.
- B.        Submit Schedule of Values in duplicate within 20 days after date of Owner-Contractor Agreement.
- C.        Revise schedule to list approved Change Orders, with each Application for Payment.

**1.4        APPLICATIONS FOR PAYMENT**

- A.        Submit four copies of each application on Contractor's electronic media driven form.
- B.        Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C.        Payment Period: 30 days.
- D.        Submit waiver of liens from vendors.
- E.        Include an updated construction progress schedule.
- F.        Certified payroll records.

**1.5        CHANGE PROCEDURES**

- A.        The Architect/Engineer/Designer may issue a Notice of Change that includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required.
- B.        The Contractor may propose changes by submitting a request for change to the Architect/Engineer/Designer describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, the effect on the Contract Sum/Price and Contract Time, and a statement describing the effect on Work by the MoDOT District or other Contractors.
- C.        Stipulated Sum/Price Change Order: Based on Notice of Change and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Architect/Engineer/Designer.
- D.        Construction Change Directive: Architect/Engineer/Designer may issue a directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

- E. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect/Engineer/Designer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- F. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- G. Execution of Change Orders: Architect/Engineer/Designer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

#### 1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specify requirements.
- B. If, in the opinion of the Architect/Engineer/Designer, it is not practical to remove and replace the Work, the Architect/Engineer/Designer will direct an appropriate remedy or adjust payment.

#### 1.7 ALTERNATIVES

- A. Accepted Alternatives will be identified in Owner-Contractor Agreement.

**END OF SECTION**

**COORDINATION AND MEETING REQUIREMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Preinstallation meetings.
- G. Equipment electrical characteristics and components.
- H. Examination.
- I. Preparation.
- J. Cutting and Patching.
- K. Alteration project procedures.

**1.2 COORDINATION AND PROJECT CONDITIONS**

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to and placing in service, such equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

**1.3 FIELD ENGINEERING (Not in Contract)**

- A. Employ a Land Surveyor registered in the State of Missouri and acceptable to Architect/Engineer/Designer.
- B. Owner will locate and protect survey control and reference points.
- C. Control datum for survey is that established by Owner provided survey.
- D. Verify setbacks and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines and levels, utilizing recognized engineering survey practices.

**1.4 PRECONSTRUCTION MEETING**

- A. Architect/Engineer/Designer will schedule a meeting after Notice of Award.

- B. Attendance Required: District engineer or representative, Architect/Engineer/Designer and Contractor.
- C. Record minutes and distribute copies within 5 days after meeting to participants, with two copies to District Engineer, Architect/Engineer/Designer, participants and those affected by decisions made.

#### 1.5 SITE MOBILIZATION MEETING

- A. Architect/Engineer/Designer will schedule a meeting at the Project site prior to Contractor occupancy.
- B. Architect/Engineer/Designer will record minutes and distributes copies within 5 days after meeting to participants, with two copies to Architect/Engineer/Designer, participants and those affected by decisions made.

#### 1.6 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at when arranged by Architect/Engineer/Designer.
- B. Architect/Engineer/Designer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, District engineer representative, Architect/Engineer/Designer, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review of Work progress.
  - 2. Field observations, problems, and decisions.
  - 3. Identification of problems, which impede planned progress.
  - 4. Maintenance of progress schedule.
  - 5. Corrective measures to regain projected schedules.
  - 6. Coordination of projected progress.
  - 7. Effect of proposed changes on progress schedule and coordination.
- E. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

#### 1.7 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.
- B. Notify Architect/Engineer/Designer seven days in advance of meeting date.
- C. Prepare agenda and preside at meeting:
  - 1. Review conditions of installation, preparation and installation procedures.
  - 2. Review coordination with related work.
- D. Record minutes and distributes copies within 5 days after meeting to participants and those affected by decisions made.

### **PART 2 PRODUCTS**

Not used

## **PART 3        EXECUTION**

### **3.1        CUTTING AND PATCHING**

- A.        Employ skilled and experienced installer to perform cutting and patching.
- B.        Submit written request in advance of cutting or altering elements, which affect:
  - 1.        Structural integrity of element.
  - 2.        Integrity of weather-exposed or moisture-resistant elements.
  - 3.        Work of Owner or separate contractor.
- C.        Execute cutting, fitting, and patching to complete Work, and to:
  - 1.        Uncover Work to install or correct ill-timed Work.
  - 2.        Remove and replace defective and non-conforming Work.
  - 3.        Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D.        Cut masonry and concrete materials using masonry saw or core drill.
- E.        Fit Work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F.        Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- G.        Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- H.        Identify hazardous substances or conditions exposed during the Work to the Architect/Engineer/Designer for decision or remedy.

### **3.2        ALTERATION PROJECT PROCEDURES**

- A.        Materials: As specified in Product sections; match existing Products and work for patching and extending work.
- B.        Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C.        When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Architect/Engineer/Designer for review.
- D.        Patch or replace portions of existing surfaces that are damaged, lifted, discolored or showing other imperfections.
- E.        Finish surfaces as specified in individual Product sections.

**END OF SECTION**

**01300**

**SUBMITTAL REQUIREMENTS**

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.        Submittal procedures.
- B.        Construction progress schedules.
- C.        Proposed Products list.
- D.        Product Data.
- E.        Shop Drawings.
- F.        Samples.
- G.        Design data.
- H.        Test reports.
- I.        Certificates.
- J.        Manufacturer's instructions.
- K.        Manufacturer's field reports.
- L.        Erection drawings.
- M.        Construction photographs.

**1.2        RELATED SECTIONS**

- A.        Section 01300 - Submittals
- B.        Section 01400 - Quality Control: Manufacturers' field services and reports.
- C.        Section 01700 - Contract Closeout: Contract warranties, bonds, manufacturers' certificates and closeout submittals.

**1.3        REFERENCES**

- A.        AGC Associated General Contractors of America publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

**1.4        SUBMITTAL PROCEDURES**

- A.        Transmit each submittal with Architect/Engineer/Designer accepted form.
- B.        Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number and specification section number, as appropriate.
- C.        Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- D.        Schedule submittals to expedite the Project, and deliver to Architect/Engineer/Designer at business address. Coordinate submission of related items.
- E.        For each submittal for review, allow 15 days excluding delivery time to and from the contractor.
- F.        Identify variations from Contract Documents and Product or system limitations, which may be detrimental to successful performance of the completed Work.
- G.        Submittals not requested will not be recognized or processed.

## 1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedule in duplicate within 15 days after date established in Notice to Proceed.
- B. Revise and resubmit as required.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.

## 1.6 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

## 1.7 PRODUCT DATA

- A. Product Data for Review:
  - 1. Submitted to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Product Data for Information:
  - 1. Submitted for the Architect/Engineer/Designer's knowledge as contract administrator or for the Owner.
- C. Product Data for Project Closeout:
  - 1. Submitted for the Owner's benefit during and after project completion.
- D. Submit the number of copies, which the Contractor requires, plus two copies that will be retained by the Architect/Engineer/Designer.
- E. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- F. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 - CONTRACT CLOSEOUT.

## 1.8 SHOP DRAWINGS

- A. Shop Drawings for Review:
  - 1. Submitted to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Shop Drawings for Information:
  - 1. Submitted for the Architect/Engineer/Designer's knowledge as contract administrator or for the Owner.



- C. Shop Drawings for Project Closeout:
  - 1. Submitted for the Owner's benefit during and after project completion.
- D. Indicate special utility and electrical characteristics, utility connection requirements and location of utility outlets for service for functional equipment and appliances.
- E. Submit in the form of one reproducible transparency and one opaque reproduction.

#### 1.9 SAMPLES

- A. Samples for Review:
  - 1. Submitted to Architect/Engineer/Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.
- B. Samples for Information:
  - 1. Submitted for the Architect/Engineer/Designer's knowledge as contract administrator or for the Owner.
- C. Samples for Selection:
  - 1. Submitted to Architect/Engineer/Designer for aesthetic, color, or finish selection.
  - 2. Submit samples of finishes for Architect/Engineer/Designer selection.
  - 3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

#### 1.10 DESIGN DATA

- A. Submit for the Architect/Engineer/Designer's knowledge as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.11 TEST REPORTS

- A. Submit for the Architect/Engineer/Designer's knowledge as contract administrator or for the Owner.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.12 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Architect/Engineer/Designer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product but must be acceptable to Architect/Engineer/Designer.

#### 1.13 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery,

storage, assembly, installation, and start-up, adjusting and finishing, to Architect/Engineer/Designer for delivery to owner in quantities specified for Product Data.

- B. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.
- C. Refer to Section 01400 - Quality Control, Manufacturers' Field Services article.

#### 1.14 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Architect/Engineer/Designer's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

#### 1.15 ERECTION DRAWINGS

- A. Submit drawings for the Architect/Engineer/Designer's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer/Designer or Owner.

**END OF SECTION**

## QUALITY CONTROL REQUIREMENTS

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Tolerances
- C. References and standards.
- D. Mock-up.
- E. Inspecting and testing laboratory services.
- F. Manufacturers' field services.

#### 1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01600 - Material and Equipment: Requirements for material and product quality.
- C. Section 01650 - Starting of Systems.

#### 1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer/Designer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

#### 1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer/Designer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

#### 1.5 REFERENCES AND STANDARDS

- A. For products or workmanship specified by association, trade or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

- B. Conform to reference standard by date of issue current on date for receiving bids or date specified in the individual specification sections, except where a specific date is established by code.
- C. Neither the contractual relationships, duties or responsibilities of the parties in Contract nor those of the Architect/Engineer/Designer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

#### 1.6 TESTING SERVICES

- A. Contractor to provide all testing services as called out in these specifications.
- B. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect/Engineer/Designer or the Owner.
- C. Testing does not relieve Contractor to perform Work to contract requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same MoDOT personnel on instructions by the Architect/Engineer/Designer.

#### 1.7 INSPECTION SERVICES

- A. Owner will employ MoDOT Personnel to perform inspection.
- B. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Architect/Engineer/Designer or the Owner.
- C. Inspecting does not relieve Contractor to perform Work to contract requirements.

#### 1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and the balancing of equipment as applicable and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Refer to Section 01300 - SUBMITTALS, MANUFACTURERS' FIELD REPORTS article.

### **PART 2 EXECUTION**

#### 2.1 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

#### 2.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer or conditioner prior to applying any new material or substance in contact or bond.

**END OF SECTION**

**CONSTRUCTION FACILITIES AND TEMPORARY CONTROL REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, telephone service, facsimile service and sanitary facilities.
- B. Temporary Controls: enclosures and fencing, protection of the Work and water control.
- C. Construction Facilities: progress cleaning and temporary buildings.

**1.2 TEMPORARY ELECTRICITY**

- A. Cost: By Contractor; pay for temporary power service furnished by MoDOT.

**1.3 TELEPHONE SERVICE**

- A. Provide, maintain, and pay for telephone service to field office and Architect/Engineer/Designer's field office at time of project mobilization.

**1.4 TEMPORARY WATER SERVICE**

- A. Connect to existing water source as directed for construction operations at time of project mobilization.
- B. Contractor will reimburse Owner for water used in construction as agreed upon at time of project mobilization.

**1.5 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

**1.6 FENCING**

- A. Construction: Use plastic mesh safety fencing or better.
- B. Provide 48" high fence around construction site; equip with vehicular and pedestrian gates with locks.

**1.7 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

**1.8 PROTECTION OF INSTALLED WORK**

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

- F. Prohibit traffic from landscaped areas.

#### 1.9 SECURITY

- A. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism or theft.
- B. Coordinate with Owner's security program.

#### 1.10 ACCESS ROADS

- A. Provide and maintain access to fire hydrants, free of obstructions.
- B. Provide means of removing mud from vehicle wheels before entering streets.
- C. Designated existing on-site roads may be used for construction traffic.

#### 1.11 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris and rubbish from site periodically and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### 1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities and materials prior to Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**01600**

**MATERIAL AND EQUIPMENT REQUIREMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

**1.2 RELATED SECTIONS**

- A. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01400 - Quality Control: Product quality monitoring.

**1.3 PRODUCTS**

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- B. Provide interchangeable components of the same manufacture for components being replaced.

**1.4 TRANSPORTATION AND HANDLING**

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct and products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement or damage.

**1.5 STORAGE AND PROTECTION**

- A. Store and protect Products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement or damage.

- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

#### 1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description is acceptable.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

#### 1.7 SUBSTITUTIONS

- A. Architect/Engineer/Designer will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
  - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
  - 2. Will provide the same warranty for the Substitution as for the specified Product.
  - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
  - 2. Submit shop drawings, product data and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
  - 3. The Architect/Engineer/Designer will notify Contractor in writing of decision to accept or reject request.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**



**CONTRACT CLOSEOUT REQUIREMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Spare parts and maintenance Products.
- G. Warranties.

**1.2 RELATED SECTIONS**

- A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.
- B. Section 01650 - Starting of Systems: System start-up, testing, adjusting and balancing.

**1.3 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer/Designer's review.
- B. Provide submittals to Owner that is required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
- D. Owner will occupy portions of the building as specified in Section 01010.

**1.4 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- C. Clean or replace filters of operating equipment used during construction and/or adjustment.
- D. Clean debris from roofs, gutters, downspouts and drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish and construction facilities from the site.

**1.5 ADJUSTING**

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

**1.6 PROJECT RECORD DOCUMENTS**

- A. Store record documents separate from documents used for construction.

- B. Record information concurrent with construction progress.
- C. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- D. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish main floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.
- E. Submit documents to Architect/Engineer/Designer's with claim for final Application for Payment.

#### 1.7 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned with Architect/Engineer/Designer comments. Revise content of all document sets as required prior to final submission.
- E. Submit two sets of revised final volumes, within 10 days after final inspection.

#### 1.8 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

#### 1.9 WARRANTIES

- A. Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers.
- B. Submit prior to final Application for Payment.
- C. For items of Work delayed beyond date of Final Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of the warranty period.

**PART 2        PRODUCTS**

Not Used.

**PART 3        EXECUTION**

Not Used.

**END OF SECTION**

**02100**

**SITE PREPARATION**

**PART 1        SCOPE**

- A.        The contractor shall visit the site and carefully examine the conditions of the premises to determine the amount of work and materials required for the work necessary to prepare the site in every respect for the construction of the truck wash.
- B.        The contractor shall be responsible for determining the quantities of materials to be excavated and handled and for the amount of backfilling, filling and grading to be done in order to perform all work required on the plans.
- C.        Unused /waste earth material can be stockpiled on site where directed by Owner.

**END OF SECTION**

**EXCAVATING, BACKFILLING AND COMPACTING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

**1.2 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity and numbers to accomplish the work of this Section in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the MoDOT Inspector.

**1.3 DELIVERY, STORAGE AND HANDLING**

- A. Comply with pertinent provisions of Section 01620.

**PART 2 PRODUCTS**

**2.1 SOIL MATERIALS**

- A. Fill and backfill materials:
  - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
  - 2. Fill material is subject to the approval of the MoDOT Inspector, and are those materials removed from excavations or imported from off-site borrow areas; predominantly granular, non-expansive soils free from roots and other deleterious matter.
  - 3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
  - 4. Cohesionless material used for structural backfill. Provide sand free from organic material and other foreign matter, and as approved by the MoDOT Inspector.
  - 5. Where granular base is called for under building slabs, provide aggregate complying with requirements of Section 03300 of these Specifications.

**2.2 WEED KILLER (Not in Contract)**

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

2.3 TOPSOIL (Not in Contract)

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, litter and other deleterious matter.
- B. Obtain topsoil/backfill from sources within the project limits as approved by Owner, or provide imported topsoil obtained from sources outside the project limits or from both sources.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 EXECUTION**

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provisions of Section 01050.

3.3 PROCEDURES

- A. Utilities:
  - 1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
  - 2. If active utility lines are encountered and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
  - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
  - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
  - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.
- B. Protection of persons and property:
  - 1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
  - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
  - 3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- C. Dewatering:
  - 1. Remove all water, including rainwater encountered during trench and sub-structure work to an approved location by pumps, drains and other approved methods.

2. Keep excavations and site construction area free from water.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.
- E. Maintain access to adjacent areas at all times.

#### 3.4 EXCAVATING

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.
- B. Satisfactory excavated materials:
  1. Transport to and place in, fill or embankment areas within the limits of the Work.
- C. Unsatisfactory excavated materials:
  1. Excavate to a distance below grade as directed by the MoDOT Inspector and replace with satisfactory materials.
  2. Include excavation of unsatisfactory materials and replacement by satisfactory materials, as parts of the work of this Section.
- D. Surplus materials:
  1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.
- E. Excavation of rock:
  1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
  2. Do not use explosives without written permission from the Architect.
- F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- G. Borrow:
  1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the MoDOT Inspector.
- H. Ditches and gutters:
  1. Cut accurately to the cross sections, grades and elevations shown.
  2. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the Work.
  3. Dispose of excavated materials as shown on the Drawings or directed by the MoDOT Inspector; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.
- I. Unauthorized excavation:
  1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Architect or the MoDOT Inspector.
  2. Under footings, foundations, or retaining walls:
    - a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.

- b. When acceptable to the soil engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
  - 3. Elsewhere backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.
- J. Stability of excavations:
  - 1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the MoDOT Inspector.
  - 2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
  - 3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- K. Excavating for structures:
  - 1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft, and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required and for inspection.
  - 2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
    - a. Excavate by hand tools to final grade just before concrete is placed.
    - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
  - 3. Excavate for footings and foundations only after general site excavating, filling and grading are complete.
- L. Excavating for pavements:
  - 1. Cut surface under pavements to comply with cross sections, elevations and grades.
- M. Cold weather protection:
  - 1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

### 3.5 FILLING AND BACKFILLING

- A. General:
  - 1. For each classification listed below, place acceptable soil material in layers to required subgrade elevations.
  - 2. In excavations:
    - a. Use satisfactory excavated or borrowed materials.
  - 3. Under building slabs:
    - a. Use subbase materials.
  - 4. Under building slabs:
    - a. Use granular fill, if so called for on the Drawings, complying with aggregate acceptable under Section 03300 of these Specifications.
- B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.
  - 1. Acceptance of construction below finish grade including, where applicable, dampproofing and waterproofing.
  - 2. Inspecting, testing, approving and recording locations of underground utilities.
  - 3. Removing concrete formwork.
  - 4. Removing shoring and bracing and backfilling of voids with satisfactory materials.
  - 5. Removing trash and debris.
  - 6. Placement of horizontal bracing on horizontally supported walls.
- C. Ground surface preparation:
  - 1. Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious matter from ground surface prior to placement of fills.



2. Plow, strip, or break up sloped surfaces steeper than one vertical to four horizontal so that fill material will bond with existing surface.
  3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize moisture-condition to the optimum moisture content and compact to required depth and percentage of maximum density.
- D. Placing and compacting:
1. Place backfill and fill materials in layers not more than 8" in loose depth.
  2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
  3. Compact each layer to required percentage of maximum density for area.
  4. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
  5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
  6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
  7. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

### 3.6 GRADING

- A. General:
1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
  2. Smooth the finished surfaces within specified tolerance.
  3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
  3. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'0", unless adjacent construction will not permit such a transition or if such a transition defeats positive control of drainage.
- B. Grading outside building lines:
1. Grade areas adjacent to buildings to achieve drainage away from the structures and to prevent ponding.
  2. Finish the surfaces to be free from irregular surface changes, and:
    - a. Shape the surface of areas scheduled to be under walks to line, grade and cross-section, with finished surface not more than 0.10 ft above or below the required subgrade elevation.
    - b. Shape the surface of areas scheduled to be under pavement to line, grade and cross-section, with finished surface not more than 0.05 ft above or below the required subgrade elevation.

### 3.7 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place and as approved by the MoDOT Inspector.
1. Structures:
    - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.

2. Lawn and unpaved areas:
    - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
    - b. Compact the upper 12" of filled areas, or natural soils exposed by excavating, at 85% of maximum density.
  3. Walks:
    - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
  4. Pavements:
    - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
- C. Moisture control:
1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
  2. Remove and replace or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
  3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the MoDOT Inspector.

### 3.8 MAINTENANCE

- A. Protection of newly graded areas:
1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
  2. Repair and establish grades in settled, eroded and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

**END OF SECTION**

**TRENCHING, BACKFILLING AND COMPACTING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

**1.2 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirement and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the construction soil engineer.

**1.3 DELIVERY, STORAGE AND HANDLING**

- A. Comply with pertinent provisions of Section 01620.

**PART 2 PRODUCTS**

**2.1 SOIL MATERIALS**

- A. Fill and backfill materials:
  - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
  - 2. Fill material is subject to the approval of the owner/architect and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, non-expansive soil free from roots and other deleterious matter.
  - 3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill.
  - 4. Cohesionless material used for backfill: Provide sand free from organic material and other foreign matter and as approved by the Owner/Architect

**2.2 OTHER MATERIALS**

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

**PART 3 EXECUTION**

**3.1 SURFACE CONDITIONS**

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provision of Section 01050.

### 3.3 PROCEDURES

- A. Utilities:
  - 1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
  - 2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
  - 3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
  - 4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Architect and secure his instructions.
  - 5. Do not proceed with permanent relocation of utilities until written instructions are received from the Architect.
- B. Protection of persons and property:
  - 1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
  - 2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
  - 3. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, washout and other hazards created by operations under this Section.
- C. Dewatering:
  - 1. Remove all water, including rainwater, encountered during trench and sub-structure work to an approved location by pumps, drains and other approved methods.
  - 2. Keep trenches and site construction area free from water.
- D. Use means necessary to prevent dust becoming a nuisance to the public, to neighbors and to other work being performed on or near the site.
- E. Maintain access to adjacent areas at all times.

### 3.4 TRENCHING

- A. Comply with pertinent provisions of Section 02220 and the provisions of this Section.
- B. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.
  - 1. Prior to backfilling, remove all sheeting.
  - 2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Architect, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Architect may permit portions of sheeting to be cut off and remain in the trench.
- C. Open cut:
  - 1. Excavate for utilities by open cut.
  - 2. If conditions at the site prevent such open cut and if approved by the Architect, trenching may be used.
  - 3. Short sections of a trench may be tunneled if, in the opinion of the Architect, the conductor can be installed safely and backfill can be compacted properly into such tunnel.

4. Where it becomes necessary to excavate beyond the limits of normal excavations lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the construction soil engineer.
  5. When the void is below the subgrade for the utility bedding, use suitable earth materials and compact to the relative density directed by the construction soil engineer, but in no case to a relative density less than 90%.
  6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the construction soil engineer but in no case to a relative density less than 80%.
  7. Remove boulders and other interfering objects and backfill voids left by such removals, at no additional cost to the Owner.
  8. Excavating for appurtenances:
    - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
    - b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel or lean concrete as directed by the construction soil engineer and at no additional cost to the Owner.
- D. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.
- E. Depressions:
1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
  2. Except where rock is encountered, do not excavate below the depth indicated or specified.
  3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.
- F. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover and other requirements as set forth by legally constituted authority having jurisdiction but in no case less than the depth shown in the Contract Documents.
- G. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.
- H. Cover:
1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade.
    - a. Areas subject to vehicular traffic:
      - (1) Sanitary sewers:
      - (2) Storm drains:
    - b. Areas not subject to vehicular traffic:
      - (1) Sanitary sewers: 30";
      - (2) Storm drains: 18".
    - c. All areas:
      - (1) Water lines: 30";
      - (2) Natural gas lines: 24";
      - (3) Electrical cables: 42";
      - (4) Electrical ducts: 36".
    - d. Concrete encased:
      - (1) Pipe sleeves for water and gas lines: 24";
      - (2) Sanitary sewers and storm drains: 12";
      - (3) Electrical ducts: 24".

2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve and electrical long-radius rigid metal conduit rise, provided it will not interfere with the structural integrity of the slab or pavement.
3. Where the minimum cover is not provided encase the pipes in concrete as indicated. Provide concrete with a minimum 28th day compressive strength of 2,500 psi.

### 3.5 BEDDING

- A. Provide bedding as indicated on the Drawings.

### 3.6 BACKFILLING

- A. General:
  1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Sections of these Specifications.
  2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the construction soil engineer.
  3. Reopen trenches that have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified or otherwise correct to the approval of the construction soil engineer.
  4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests and approvals.
  5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.
- B. Lower portion of trench:
  1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 24" over sewers and 12" over other utility lines.
  2. Take special care in backfilling and bedding operations to not damage pipe and pipe coatings.
- C. Remainder of trench:
  1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.
  2. Deposit backfill material in layers not exceeding the thickness specified and compact each layer to the minimum density directed by the construction soil engineer.
- D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.
- E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the construction soil engineer, in areas other than building and pavement areas.

### 3.7 TEST FOR DISPLACEMENT OF SEWERS AND STORMDRAINS

- A. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.
- B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.
- C. If the illuminated interior of the pipeline shows poor alignment, displaced pipes, or any other defects, correct the defects to specified conditions and at no additional cost to the Owner.

### 3.8 PIPE JACKING

- A. The Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction approved by the construction soil engineer.

### 3.9 TUNNELING OPERATIONS

- A. The Contractor may, at his option, tunnel pipes into position using procedures approved by the construction soil engineer and the governmental agencies having jurisdiction.

### 3.10 FIELD QUALITY CONTROL

- A. The construction soil engineer will inspect open cuts and trenches before installation of utilities, and will make the following tests:
  - 1. Assure that trenches are not backfilled until all tests have been completed.
  - 2. Check backfilling for proper layer thickness and compaction.
  - 3. Verify that test results conform to the specified requirements, and that sufficient tests are performed.
  - 4. Assure that defective work is removed and properly replaced.

**END OF SECTION**

**SANITARY SEWERAGE SYSTEM**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Provide sanitary sewerage system as shown on the Drawings, specified herein and needed for a complete and proper installation.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

**1.2 SUBMITTALS**

- A. Comply with pertinent provisions of Section 01340.
- B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:
  - 1. Materials list of items proposed to be provided under this Section;
  - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
  - 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

**1.3 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with pertinent provisions of Section 01620.

**PART 2 PRODUCTS**

**2.1 PIPE AND FITTINGS**

- A. Cast iron soil pipe and fittings (CIP):
  - 1. Comply with ASTM A74, class SV.
  - 2. Use rubber gaskets complying with ASTM C564 for compression joints.
- B. Clay pipe and fittings (VCP):
  - 1. Use extra strength, minimum of SDR 35.
  - 2. Comply with ASTM D3034.
- C. Polyvinyl chloride pipe and fitting (PVC)
  - 1. Use extra strength, minimum of SDR 35.
  - 2. Comply with ASTM D3034.
- D. Acrylonitrile butadiene styrene pipe and fittings (ABS):
  - 1. Comply with ASTM D2680.



## 2.2 FRAMES AND COVERS

- A. Use cast iron frames and covers, with the wording "SEWER" cast into the covers in letters 2" high and plainly visible, as manufactured by Alhambra Foundry.

## 2.3 CLEANOUTS

- A. Provide cleanouts as required and where shown on the Drawings.
  - 1. Provide traffic weight covers and frames where clean-outs are within pavement, with the letters "SSCO" cast into the cover.
  - 2. Acceptable products:
    - a. Alhambra Foundry, Model A\_2100, 10" round cover, unless otherwise shown on the Drawings.
- B. Where cleanout is within a graded area, construct as shown on the Drawings or 100 ft on center minimum.

## 2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

# **PART 3 EXECUTION**

## 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

## 3.2 FIELD MEASUREMENTS

- A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

## 3.3 INSTALLATION

- A. Trench, backfill, and compact for the work of this Section in strict accordance with pertinent provisions of Section 02221 of these Specifications.
- B. Location:
  - 1. Where the sewer location is not located clearly by dimensions on the Drawings, locate the sewer:
    - a. Where the bottom of the water pipe will be at least 12" above the top of the sewer pipe, the horizontal spacing may be a minimum of six feet.
    - b. Where the gravity flow sewers cross above water lines, fully encase the sewer pipe for a distance of ten feet on each side of the crossing; or
    - c. Use acceptable pressure pipe with no joint closer horizontally than three feet from the crossing.
    - d. Where concrete encasement is used, provide not less than 4" thickness including that on pipe joints.
- C. Pipe laying:
  - 1. Protect pipe during handling against shocks and free fall. Remove extraneous material from the pipe interior.
  - 2. Lay pipe by proceeding upgrade with the spigot ends of bell-and-spigot pipe pointing in direction of flow.

3. Lay each pipe accurately to the indicated line and grade, aligning so the sewer has a uniform invert.
4. Continually clear interior of the pipe free from foreign material.
5. Before making pipe joints, clean and dry all surfaces of the pipe to be joined.
6. Use lubricants, primers, and adhesives recommended for the purpose by the pipe manufacturer.
7. Place, fit, join, and adjust the joints to obtain the degree of water tightness required.

**END OF SECTION**

## **03100**

### **CONCRETE FORMWORK**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

##### **1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION**

- A. Section 03200 - Concrete Reinforcement
- B. Section 03300 - Cast-in-Place Concrete: Supply of concrete accessories for placement by this section.
- C. Section 05500 - Metal Fabrications: Supply of metal fabrications for placement by this section.

##### **1.3 RELATED SECTIONS**

- A. Section 03200 - Concrete Reinforcement.
- B. Section 03300 - Cast-in-Place Concrete.

##### **1.4 REFERENCES**

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 347 - Recommended Practice For Concrete Formwork.
- D. PS 1 - Construction and Industrial Plywood.

##### **1.5 DESIGN REQUIREMENTS**

- A. Design, engineer and construct formwork, shoring and bracing to conform to design and code requirements; concrete to conform to required shape, line and dimension.

##### **1.6 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on void form materials and installation requirements.

##### **1.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 347.

##### **1.8 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for design, fabrication, erection and removal of formwork.

##### **1.9 FIELD SAMPLES**

- A. Provide under provisions of Section 01400. Coordinate with requirements stated in Section 03100 and 03300.

#### 1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver void forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

#### 1.11 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate this Section with other Sections of work that require attachment of components to formwork.
- C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

### **PART 2 PRODUCTS**

#### 2.1 WOOD FORM MATERIALS

- A. Plywood: Douglas fir species; grade B/B plyform class 1 or 2; sound undamaged sheets with clean, true edges.
- B. Lumber: Douglas fir species; standard grade; with grade stamp clearly visible.

#### 2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Pan Type: Steel of size and profile required.
- C. Tubular Column Type: Round, spirally wound laminated fiber material, surface treated with release agent, non-reusable, of sizes required.
- D. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

#### 2.3 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- D. Flashing Reglets: Galvanized steel, 22 gauge thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- E. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- F. Waterstops: Rubber, minimum 1,750 p.s.i tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

## **PART 3        EXECUTION**

### **3.1        EXAMINATION**

- A.        Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

### **3.2        EARTH FORMS**

- A.        Earth forms are not permitted.

### **3.3        ERECTION - FORMWORK**

- A.        Erect formwork, shoring and bracing to achieve design requirements, in accordance with ACI 301.
- B.        Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C.        Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D.        Align joints and make watertight. Keep form joints to a minimum.
- E.        Obtain approval before framing openings in structural members that are not indicated on Drawings.
- F.        Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

### **3.4        APPLICATION - FORM RELEASE AGENT**

- A.        Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B.        Apply prior to placement of reinforcing steel, anchoring devices and embedded items.
- C.        Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### **3.5        INSERTS, EMBEDDED PARTS, AND OPENINGS**

- A.        Provide formed openings where required for items to be embedded in passing through concrete work.
- B.        Locate and set in place items which will be cast directly into concrete.
- C.        Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts and components of other Work.
- D.        Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
- E.        Install water-stops continuous without displacing reinforcement. Heat seal joints watertight.
- F.        Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G.        Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

### **3.6        FORM CLEANING**

- A.        Clean forms as erection proceeds, to remove foreign matter within forms.
- B.        Clean formed cavities of debris prior to placing concrete.
- C.        Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D.        During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design and that supports, fastenings, wedges, ties and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

**END OF SECTION**

**03200**

**CONCRETE REINFORCEMENT**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

**1.2 RELATED SECTIONS**

- A. Section 03100 - Concrete Formwork.
- B. Section 03300 - Cast-in-Place Concrete.

**1.3 REFERENCES**

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 318 - Building Code Requirements For Reinforced Concrete.
- C. ACI SP-66 - American Concrete Institute - Detailing Manual.
- D. ACI 315-99 – Details and Detailing of Concrete Reinforcement
- E. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- F. ANSI/ASTM A184 - Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
- G. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- I. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- J. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
- K. CRSI - Concrete Reinforcing Steel Institute - Manual of Standard Practice.
- L. CRSI - Placing Reinforcing Bars.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with CRSI - Manual of Standard Practice & ACI 318.

**1.5 COORDINATION**

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate with placement of formwork, formed openings and other Work.

**PART 2 PRODUCTS**

**2.1 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615, yield grade; deformed billet steel bars, unfinished.

- B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 60; steel bars or rods, unfinished.
- C. Stirrup Steel: ANSI/ASTM A82, unfinished.
- D. Welded Steel Wire Fabric: ASTM A815; in flat sheets.

## 2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel; size and shape as required.

## 2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice ACI SP-66.

# **PART 3 EXECUTION**

## 3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Conform to applicable code for concrete cover over reinforcement.

**END OF SECTION**



**03300**

**CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Cast-In-Place Concrete floors, shear walls, foundation walls and supported slabs.
- B. Floors and slabs on grade.
- C. Control, expansion and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads, light pole base, flagpole base, thrust blocks and manholes.

**1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION**

- A. Section 03100 - Concrete Formwork: Placement of joint device anchors in formwork.

**1.3 RELATED SECTIONS**

- A. Section 03100 - Concrete Formwork: Formwork and accessories.
- B. Section 03200 - Concrete Reinforcement.
- C. Section 03346 - Concrete Floor Finishing.
- D. Section 03370 - Concrete Curing.
- E. Section 07900 - Joint Sealers.

**1.4 REFERENCES**

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- D. ACI 305R - Hot Weather Concreting.
- E. ACI 306R - Cold Weather Concreting.
- F. ACI 318 - Building Code Requirements for Reinforced Concrete.
- G. ANSI/ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- H. ANSI/ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type.
- I. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- J. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- K. ASTM C33 - Concrete Aggregates.
- L. ASTM C94 - Ready-Mixed Concrete.
- M. ASTM C150 - Portland cement.

N. ASTM C260 - Air Entraining Admixtures for Concrete.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on joint devices, attachment accessories and admixtures.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.

1.7 COORDINATION

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

**PART 2 PRODUCTS**

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal, Type II - Moderate, Type V - Sulfate Resistant.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.

2.3 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion.
- B. Vapor Barrier: thick clear polyethylene film.
- C. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; ASTM D994; Asphalt impregnated fiberboard or felt, 1/2" thick; tongue and groove profile.
- B. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.
- C. Joint Filler Type C: ASTM D1752; Pre-molded sponge rubber fully compressible with recovery rate of minimum 95 percent.
- D. Expansion Joint Devices: ASTM B221 alloy, extruded aluminum; resilient filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum cover plate, of longest manufactured length at each location, flush Mounted, color as selected.
- E. Sealant: ASTM D1190; polymer based asphalt or coal tar and rubber compound.

2.5 CONCRETE MIX

- A. All concrete shall be Type 1 cement with a compressive strength of 4,000 p.s.i. at 28 days.
- B. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.

- C. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by Architect/Engineer.
- E. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.
- F. Add air entraining agent to normal weight concrete mix for work exposed to exterior.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify site conditions under provisions of Section 01039.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

#### **3.2 PREPARATION**

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

#### **3.3 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304 & ACI 301.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Separate slabs on grade from vertical surfaces with 1/2" thick joint filler.
- E. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- G. Install joint devices in accordance with manufacturer's instructions.
- H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- I. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- J. Install joint covers in longest practical length, when adjacent construction activity is complete.
- K. Apply sealants in joint devices in accordance with Section 07900.
- L. Place concrete continuously between predetermined expansion, control and construction joints.
- M. Do not interrupt successive placement; do not permit cold joints to occur.
- N. Place floor slabs in pattern indicated on drawings.

- O. Saw cut joints within 24 hours after placing. Use 3/16" thick blade, cut into 1/4 depth of slab thickness. If in-slab-heating is used cut joints 1/2 inch deep
  - P. Screed floors and slabs on grade level, maintaining surface flatness of maximum.
- 3.4 SEPARATE FLOOR TOPPINGS
- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
  - B. Place required dividers, edge strips, reinforcing, and other items to be cast in.
  - C. Apply bonding agent to substrate in accordance with manufacturer's instructions.
- 3.5 CONCRETE FINISHING
- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
  - B. Finish concrete floor surfaces to requirements of Section 03346.
- 3.6 CURING AND PROTECTION
- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
  - B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - C. Cure concrete floor surfaces to requirements of Section 03370.
  - D. Cure floor surfaces in accordance with ACI 308.
- 3.7 FIELD QUALITY CONTROL
- A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of Section 01400.
  - B. Provide free access to Work and cooperate with appointed firm.
  - C. Submit proposed mix design to architect for review prior to commencement of Work.
  - D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
  - E. Three concrete test cylinders will be taken for every 75 or less cu yards of concrete placed.
  - F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
  - G. One slump test will be taken for each set of test cylinders taken.
- 3.8 PATCHING
- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
  - B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
  - C. Patch imperfections as directed.
- 3.9 DEFECTIVE CONCRETE
- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
  - B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.
  - C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

**END OF SECTION**

**CONCRETE FLOOR FINISHING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Finishing slabs-on-grade.
- B. Surface treatment with concrete hardener, non-skid finish and sealer.

**1.2 RELATED SECTIONS**

- A. Section 03300 - Cast-in-Place Concrete: Prepared concrete floors ready to receive finish; control and formed expansion and contraction joints and joint devices.
- B. Section 03370 - Concrete Curing.
- C. Section 07900 - Joint Sealers.

**1.3 REFERENCES**

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ASTM E1155 - Determining Floor Flatness and Levelness Using the F-Number System.

**1.4 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on concrete hardener, sealer and slip resistant treatment, compatibilities and limitations.

**1.5 MAINTENANCE DATA**

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Provide data on maintenance renewal of applied coatings.

**1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301 and ACI 302.

**1.7 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, protect, and handle products to site under provisions of Section 01039.
- B. Deliver materials in manufacturer's packaging including application instructions.

**1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Temporary Lighting: Minimum 200 W light source, placed above the floor surface, for each 100 square feet of floor being finished.
- B. Do not finish floors until the interior heating system is operational.
- C. Ventilation: Sufficient to prevent injurious gases from temporary heat or other sources affecting concrete.

**1.9 COORDINATION**

- A. Coordinate work under provisions of Section 01039.
- B. Coordinate the work with concrete floor placement and concrete floor curing.

## **PART 2        PRODUCTS**

### **2.1        CURING/SEALING COMPOUNDS**

- A.        Curing/sealing compound equal to Ashford Formula as distributed by:  
            Curecrete Chemical Company, Inc.  
            1201 W. Spring Creek Place  
            Springville, UT 84663  
            (801) 489-5663

## **PART 3        EXECUTION**

### **3.1        EXAMINATION**

- A.        Verify site conditions under provisions of Section 01039.
- B.        Verify that floor surfaces are acceptable to receive the work of this section.

### **3.2        FLOOR FINISHING**

- A.        Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
- B.        Steel trowel surfaces that will receive carpeting, resilient flooring and seamless flooring.
- C.        Steel trowel surfaces that areas scheduled to be exposed.
- D.        In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at nominal.

### **3.3        FLOOR SURFACE TREATMENT**

- A.        Apply sealer in accordance with manufacturer's instructions on floor surfaces.

### **3.4        TOLERANCES**

- A.        Maximum Variation of Surface Flatness for Exposed Concrete Floors: 1/4 inch.

**END OF SECTION**

**CONCRETE CURING**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete.
- B. Section 03346 - Concrete Floor Finishing.

1.3 REFERENCES

- A. ACI 301 - Structural Concrete for Buildings.
- B. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction.
- C. ACI 308 - Standard Practice for Curing Concrete.
- D. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- E. ASTM D2103 - Polyethylene Film and Sheeting.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products under provisions of Section 01600.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

**PART 2 PRODUCTS**

2.1 MATERIALS

- A. Curing/sealing compound equal to Ashford Formula as distributed by:  
Curecrete Chemical Company, Inc.  
1201 W. Spring Creek Place  
Springville, UT 84663  
(801)489-5663

**PART 3 EXECUTION**

3.1 EXAMINATION

- A. Verify substrate conditions under provisions of Section 01039.
- B. Verify that substrate surfaces are ready to be cured.

3.2 EXECUTION - HORIZONTAL SURFACES

- A. Cure floor surfaces in accordance with ACI 308.

3.3 EXECUTION - VERTICAL SURFACES

- A. Cure surfaces in accordance with ACI 308.

3.4 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit traffic over unprotected floor surface.

**END OF SECTION**



## **04100**

### **MORTAR AND MASONRY GROUT**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Mortar and grout for masonry.

##### **1.2 RELATED SECTIONS**

- A. Section 04305 - Brick Masonry System.

##### **1.3 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 530 and ACI 530.1.

##### **1.4 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS**

- A. Premix Mortar: ASTM C387, using gray cement, normal strength.
- B. Mortar Aggregate: ASTM C144, standard masonry type.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.
- F. Bonding Agent: Epoxy type.

##### **2.2 MORTAR MIXES**

- A. Mortar for Masonry below Grade and in Contact with Earth: ASTM C270, Type M.
- B. Mortar for Reinforced Masonry: ASTM C270, Type S.
- C. Mortar for Reinforced Masonry: ASTM C270, Type S.
- D. Mortar for Non-load Bearing Walls and Partitions: ASTM C270, Type S or Type N.

##### **2.3 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
- B. Add admixtures in accordance with manufacturer's instructions.
- C. Do not use antifreeze compounds to lower the freezing point of mortar.

##### **2.4 MORTAR COLOR**

- A. Mortar Color: Mineral oxide pigment, color as selected by Architect.

## 2.5 GROUT MIXES

- A. Grout: Mixed in accordance with ASTM C476; provide consistency required at time of placement to fill completely all spaces indicated to be grouted.
  - 1. Use fine grout in spaces less than 2 inches in least horizontal dimension.
  - 2. Use coarse grout in spaces 2 inches or more in least horizontal dimension.

## 2.6 GROUT MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476.
- B. Do not use anti-freeze compounds to lower the freezing point of grout.

## 2.7 MIX TESTS

- A. Testing of Mortar Mix: In accordance with ASTM C780
- B. Testing of Grout Mix: In accordance with ASTM C1019.

# **PART 3 EXECUTION**

## 3.1 INSTALLATION

- A. Install mortar in accordance with ASTM C780.
- B. Perform all grouting by means of low-lift technique.
  - 1. Maintain minimum dimension of 2 inches and minimum area of 6 square inches in cells to be grouted. Extend vertical reinforcement above pour height as required for splicing.
  - 2. Lay masonry units to maximum pour height, not to exceed 32 inches.
  - 3. Place grout continuously and consolidate immediately; do not interrupt pour for more than one hour.
  - 4. Stop vertical pours 1-1/2 inches below bond beams to interlock with vertical cores.
- C. Work grout into masonry cores and cavities to eliminate voids. Do not displace reinforcement.

**END OF SECTION**

**UNIT MASONRY SYSTEM**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Concrete masonry units.
- B. Reinforcement, anchorage and accessories.
- C. Pargeted masonry surfaces.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control.
- B. Section 05500 - Metal Fabrications: Loose steel lintels and fabricated steel items.
- C. Section 07160 - Bituminous: Dampproofing masonry surfaces.
- D. Section 07212 - Rigid Insulation: Insulation for cavity spaces.
- E. Section 07900 - Joint Sealers: Rod and sealant at control and expansion joints.

1.3 REFERENCES

- A. ACI 530 - Building Code Requirements for Masonry Structures.
- B. ACI 530.1 - Specifications for Masonry Structures.
- C. ASTM A82 - Cold-Drawn Steel Wire for Concrete Reinforcement.
- D. ASTM C129 - Non-Load Bearing Concrete Masonry Units.
- E. ASTM C744 - Pre-faced Concrete and Calcium Silicate Masonry Units.
- F. UL - Fire Resistance Directory.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during and 48 hours after completion of masonry work.

1.5 COORDINATION

- A. Coordinate work under provisions of Section 01039.

**PART 2 PRODUCTS**

2.1 CONCRETE MASONRY UNITS

- A. ASTM C90, Standard Specification for load bearing Concrete Masonry Units shall apply as required.
- B. Size and Shape: Nominal modular size of 8 x 8 x 16 inches. Provide special units for 90-degree corners, bond beams, lintels and bullnosed corners.

2.2 REINFORCEMENT AND ANCHORAGE

- A. Single Wythe Joint Reinforcement: Truss type; steel wire, hot dip galvanized to ASTM A641 Class 3 after fabrication, cold drawn steel wire conforming to ASTM A82, 3/16 inch side rods with 1/16 inch cross ties.
- B. Wall Ties: bent steel shape, 1 x 6 inch size x 18 gauge thick, hot dip galvanized to ASTM A123 finish.

### 2.3 FLASHINGS

- A. Galvanized Steel: ASTM A525, 24-gauge core steel.

### 2.4 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, heat fused joints.
- B. Building Paper: No. 15 asphalt saturated felt.
- C. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- D. Weeps: Preformed plastic tubes, hollow.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

### 2.5 SEALERS

- A. Provide sealer to exterior concrete masonry units equal to Sure Klean; Blok-Guard S or Weather Seal Siloxane WB Concentrate as manufactured by: ProSoCo, Inc.

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify items provided by other sections of work are properly sized and located.
- C. Verify that built-in items are in proper location and ready for roughing into masonry work.

### 3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### 3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
  - 1. Bond: Running.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches.
  - 3. Mortar Joints: Beveled.

### 3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as work progresses.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

### 3.5 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07900 for sealant performance.
- D. Form expansion joint as detailed.

### 3.6 TOLERANCES

- A. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

### 3.7 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, sleeves and grounds. Coordinate with other sections of work to provide correct size, shape and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### 3.8 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Section 01400.
- B. Inspect all masonry work.

### 3.9 CLEANING

- A. Clean work under provisions of 01700.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

### 3.10 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

**END OF SECTION**

## **05500**

### **METAL FABRICATIONS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Shop fabricated ferrous metal items.

##### **1.2 RELATED SECTIONS**

- A. Section 09900 - Painting: Paint finish.
- B. Section 03300 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.
- C. Section 04300 - Unit Masonry System: Placement of metal fabrications in masonry.

##### **1.3 REFERENCES**

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A283 - Carbon Steel Plates, Shapes and Bars.
- E. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 p.s.i Tensile Strength.
- F. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- G. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- H. AWS A2.0 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53, Grade B, Schedule 40.
- E. Bolts, Nuts, and Washers: ASTM A325 galvanized to ASTM A153 for galvanized components.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Ladders: ANSI A14.3.
- H. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

##### **2.2 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## 2.3 FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation: from plane: 1/16 inch in 48 inches.

## 2.4 FINISHES - STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat.
- D. Structural Steel Members: Galvanize after fabrication to ASTM A123. [Provide minimum 1.25 oz/sq ft galvanized coating.]
- E. Non-structural Items: Galvanized after fabrication to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.
- F. Chrome Plating: ASTM B177, weight, nickel-chromium alloy, satin finish.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

## 3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

## 3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on Drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

## 3.4 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset from True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

**END OF SECTION**

**05531**

**GRATINGS AND FLOOR PLATES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Pit drain grating.

**1.2 RELATED SECTIONS**

- A. Section 03100: Framed concrete opening.
- B. Section 05500 - Metal Fabrications.
- C. Section 09900 - Painting: Field paint finish.
- D. Section 03100: Placement of grating frames in concrete.

**1.3 REFERENCES**

- A. ASTM A36/A36M - Structural Steel.
- B. ASTM A123 - Zinc (Hot Galvanized) Coatings on Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip.
- C. ASTM A510 - Wire Rods and Coarse Round Wire, Carbon Steel.
- D. ASTM A525 - Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process.
- E. ASTM A569/A569M - Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- F. AWS D1.1 - Structural Welding Code.
- G. AWS A2.0 - Standard Welding Symbols.
- H. NAAMM A202.1 - Metal Bar Grating Manual.
- I. SSPC - Steel Structures Painting Council: Steel Structures Painting Manual.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Conform to BOCA code for applicable loads.
- B. Maximum spacing between bars: To restrict pedestrian shoe heels.3/8 inch.

**1.5 SUBMITTALS FOR REVIEW**

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate details of gratings, plates, component supports, anchorage, openings and perimeter construction details.
- C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

**1.6 PROJECT CONDITIONS**

- A. Section 01039 - Coordination and Meetings.
- B. Coordinate the Work with placement of frames, tolerances for placed frames and openings.



## **PART 2        PRODUCTS**

### **2.1        MATERIALS**

- A.        Sheet Steel for Die Stamping: ASTM A525; with raised lug pattern.
- B.        Cross Bars: ASTM A510.
- C.        Welding Materials: AWS D1.1, type required for materials being welded.
- D.        Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

### **2.2        ACCESSORIES**

- A.        Fasteners and Saddle Clips: Flange Blocks: J-Hooks: Galvanized steel.
- B.        Perimeter Closure: Of same material as grating.
- C.        Edge Banding: At edges and at intermediate panel edges.

### **2.3        FABRICATION**

- A.        Fabricate grates and plates to accommodate design loads.
- B.        Mechanically clinch joints of intersecting metal sections.
- C.        Fabricate support framing for openings.

### **2.4        FINISHES**

- A.        Clean surfaces of rust, scale, grease and foreign matter prior to finishing.
- B.        Do not prime surfaces in direct contact with concrete or where field welding is required.
- C.        Prime paint items with one coat.

## **PART 3        EXECUTION**

### **3.1        EXAMINATION**

- A.        Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
- B.        Verify that opening sizes and dimensional tolerances are acceptable.
- C.        Verify that supports and anchors are correctly positioned.

### **3.2        INSTALLATION**

- A.        Place frames in correct position, plumb and level.
- B.        Mechanically cut galvanized finish surfaces. Do not flame cut.
- C.        Anchor by welding to saddle clips or bolting to flange blocks.
- D.        Set perimeter closure flush with top of grating and surrounding construction.
- E.        Secure to prevent movement.

### **3.3        TOLERANCES**

- A.        Conform to NAAMM A202.1.

### **3.4        CLEANING**

- A.        Clean welds and damaged coatings and apply one coats of touch-up primer.

**END OF SECTION**

**FRAMING AND SHEATHING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Roof framing.
- B. Built-up structural beams and columns.
- C. Diaphragm trusses fabricated on site.
- D. Floor, wall and roof sheathing.
- E. Sill flashings.
- F. Preservative treatment of wood.
- G. Fire retardant treatment of wood.
- H. Miscellaneous framing and sheathing.
- I. Telephone and electrical panel back boards.
- J. Concealed wood blocking for support of toilet and bath accessories, wall cabinets and wood trim.

**1.2 RELATED SECTIONS**

- A. Section 04300: Setting anchors in concrete or masonry.
- B. Section 05500: Prefabricated steel structural supports.
- C. Sections 08111 and 08520: Window and Door openings to receive wood blocking.

**1.3 REFERENCES**

- A. AHA (American Hardboard Association) A135.4 - Basic Hardboard.
- B. ALSC (American Lumber Standards Committee) - Softwood Lumber Standards.
- C. ANSI A208.1 - Mat-Formed Wood Particleboard.
- D. APA (American Plywood Association).
- E. NFPA (National Forest Products Association).
- F. SPIB (Southern Pine Inspection Bureau).
- G. WCLIB (West Coast Lumber Inspection Bureau).
- H. WWPA (Western Wood Products Association).

**1.4 SUBMITTALS FOR REVIEW**

- A. Shop Drawings for Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.

**1.5 QUALITY ASSURANCE**

- A. In lieu of grade stamping exposed to view lumber and plywood, submit manufacturer's certificate certifying that products meet or exceed specified requirements.
- B. Design structural shop fabricated trusses under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Missouri.

**1.6 DELIVERY, STORAGE AND PROTECTION**

- A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
- B. Protect trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

## **PART 2        PRODUCTS**

### **2.1        2x MATERIALS**

- A.        #2 or better.

### **2.2        ACCESSORIES**

- A.        Fasteners and Anchors:
  - 1.        Fasteners: As indicated on the Drawings.

## **PART 3        EXECUTION**

### **3.1        FRAMING**

- A.        Set structural members level and plumb, in correct position.
- B.        Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- C.        Place horizontal members, crown side up.
- D.        Construct load bearing framing members' full length without splices.
- E.        Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
- F.        Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.
- G.        Bridge joists or other framing in excess of 8 feet span at mid-span. Fit solid blocking at ends of members.
- H.        Place full width continuous sill flashings under framed walls on cementitious foundations. All lap flashing joints at 4 inches.
- I.        Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses or plywood web joists.

### **3.2        TOLERANCES**

- A.        Framing Members: 1/4 inch from true position, maximum.
- B.        Surface Flatness of Floor: 1/4 inch in 10 feet maximum and 1/2 inch in 30 feet    maximum.

**END OF SECTION**

**ALUMINUM SOFFIT PANELS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Preformed aluminum soffit panels, trim, and accessories for enclosing exterior roof overhangs.

**1.2 RELATED SECTIONS**

- A. Section 05500 – Metal Fabrications.
- B. Section 06112 – Framing and Sheathing.
- C. Section 07900 – Joint Sealers.

**1.3 REFERENCES**

- A. AAMA 1402-86 – Aluminum Siding, Soffit, and Fascia.
- B. ASTM B 209 – Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM D 226 – Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- D. ASTM E 84 – Surface Burning Characteristics of Building Materials.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Soffits shall be fabricated and installed to withstand positive and negative wind pressure loads in accordance with applicable codes.
- B. Soffit system to accommodate without damage to components or failure of weather barrier movement caused by seasonal temperature cycling and deflection of structural support framing.
- C. Moisture entering or condensation occurring within soffit system shall drain to exterior.

**1.5 SUBMITTALS**

- A. Provide in accordance with Section 01300:
  - 1. Product data including material descriptions, dimensions, and profiles.
  - 2. Shop drawings showing layout, location of vents, dimensions, penetrations, trim, and installation methods.
  - 3. 4 inch long minimum samples of soffit panel and trim in color selected.
  - 4. Certificates documenting soffit system complies with requirements specified.
  - 5. Manufacturer's installation instructions.
  - 6. Copy of warranty for review by Architect.

**1.6 QUALITY ASSURANCE**

- A. Manufacturer: Company with a minimum 5 years' successful experience manufacturing aluminum soffit.
- B. Single Source Responsibility: To ensure functional and appearance compatibility, soffit panels and all trim pieces shall be products of single manufacturer.
- C. Aluminum soffit system shall be fabricated and installed to comply with:
  - 1. AAMA 1402-86.
  - 2. International Code Council-ES Legacy – Report No. 97-64.
  - 3. International Conference of Building Officials (ICBO): Report No. 2027.

## 1.7 PRODUCT HANDLING

- A. Deliver components in manufacturer's protective cartons clearly labeled as to specific products contained.
- B. During delivery and storage keep cartons flat and supported along entire length.
- C. Store material off ground, out of weather, in dry place. Provide ventilation. Protect from falling objects and construction activities.
- D. Handling: Avoid gouging, scratching, and denting.

## 1.8 WARRANTY

- A. Provide under provisions of section 01780 – Closeout Submittals: Fifty (50) year lifetime limited, non-prorated, transferable warranty.

# PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Fabricate soffit panels and trim from sheet aluminum complying with ASTM B 209, AA3000 Alloy:
- B. Minimum Aluminum Properties:
  - 1. Ultimate Strength: 25 KSI.
  - 2. Yield Strength: 22 KSI.
  - 3. Modulus of Elasticity: 10,000 KSI.
  - 4. Coefficient of Linear Thermal Expansion:  $1.31 \times 10^{-5}$  inch/inch/degree F.
  - 5. Melting Range: 1175 to 1210 degrees F.

## 2.2 SOFFIT PANELS

- A. Type: Fully vented, hi-tensile, double V-groove soffit panel with installation flanges along both edges.
  - 1. Dimensions: 12 inches exposed width by 144 inches long.
  - 2. Thickness: 0.016 inches.
  - 3. Profile: V-grooves forming three (3) 4-inch wide panels with all panels vented.
  - 4. Net Free Open Area: 11.6 square inches per linear foot.
  - 5. Surface: Smooth.
  - 6. Finish Color: White.

## 2.3 TRIM

- A. Provide trim pieces as detailed on manufacturer's installation manual and as required for complete, weathertight, functional installation.
- B. Aluminum Trim: Fabricate from same material as soffit to shape, dimensions, and profile required to accommodate soffit panel and project conditions. Provide with channels to receive panels, flanges for concealed weathertight attachment, and slotted attachment holes. Color shall match or coordinate with soffit color. In order to eliminate or minimize visible joints, form in longest possible lengths with 10 feet being the minimum.
  - 1. J-channel: ½ inch wide channel to receive soffit panels with ½ inch attachment flange.
  - 2. Reverse Frieze Molding: F-shaped piece with ½ inch wide channel to receive aluminum soffit panels.
  - 3. Soffit T-Bar: Double channel to receive two soffit panels with exposed face.

## 2.4 ACCESSORIES

- A. Fasteners: Weather and corrosion resistant nails of type, size, and spacing as recommended by soffit manufacturer.
  - 1. Plain Shank Nails: Use for wood studs, furring, and other framing with minimum lengths of 1-1/2 inches. Allow 3/4 inch minimum penetration into wood framing.
  - 2. Screw Shank Nails: Use for plywood sheathing.
  - 3. Exposed Nails: Trim nails that match soffit and trim.
- B. Sealants: Silicone type as recommended by soffit manufacturer.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Prepare substrate and install soffit in accordance with manufacturer's instructions, approved shop drawings, and manufacturer's soffit installation manual.
- B. Coordinate work with provisions and installation of exterior insulation finish system to ensure compatibility and weathertight, neat transition from vertical surface to horizontal soffit panels.

### 3.2 PREPARATION

- A. Inspection: Verify that soffit support framing is rigid, level, and spacing does not exceed 24 inches. Do not proceed until deficiencies are addressed.

### 3.3 INSTALLATION

- A. Field Cutting: Accurately measure and cut soffit panels and trim. Use power circular saw with 10-point aluminum cutting blade, duckbill sheet metal snips, or hacksaw as recommended by manufacturer for specific cutting operation.
- B. Trim: Prior to installing soffit panels, locate and anchor perimeter to receive channels.
- C. Soffit Panels:
  - 1. Layout panels as detailed on approved shop drawings. Provide vented panels to provide sufficient ventilation of space above soffit.
  - 2. Insert panel into receiver channel, flex panel, and insert other end into opposing receiver channel. Ensure panels are perpendicular to perimeter and aligned. Fasten panel to supports by nailing through attachment flanges.
  - 3. Overlap, engage, and lock subsequent panels over preceding ones.
  - 4. At corners, miter cut soffit panels and install with soffit T-bar. Align joints and grooves of intersecting panels.
- D. Expansion Joints: Where soffit panel engages receiver channel and where aluminum components butt or adjoin other materials, leave expansion gap:
  - 1. Hot weather with aluminum components partially expanded: 1/16 inch.
  - 2. Cold weather with aluminum components partially contracted: 1/8 inch.
- E. Fastening: Install panels and trim with nails. Where exposed, use trim nails with color to match aluminum components.
  - 1. Drive fasteners straight and level. Do not slant fasteners.
  - 2. Do not drive head of fastener tightly against attachment flange. Allow 1/32 inch clearance between fastener head and aluminum surface.
  - 3. Do not place fastener through face of soffit panel.
  - 4. Spacing: Fasten soffit panels at 24 inches maximum.
- E. Sealants: Apply sealants where indicated on manufacturer's approved shop drawings and as required to provide weathertight installation. Depth of sealant bead shall be 1/4 inch minimum.

#### 3.4 CLEANING AND PROTECTION

- A. Clean aluminum soffits and trim. Use detergent as required. Do not use solvents, abrasive, wire brushes, or steel scrapers.
- B. Remove Excess materials and debris from site.
- C. Protect soffit from subsequent construction operations. If damage occurs, remove and replace damaged components to provide installation in original, undamaged condition.

**END OF SECTION**

**FLASHING AND SHEET METAL**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Metal Roof Flashing and Trim

1.2 RELATED SECTIONS

- A. Section 07900 - Sealants

1.3 REFERENCES

- A. ASTM A 526 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
- B. ASTM A 527 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality.
- C. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. National Roofing Contractors Association (NRCA) – “Roofing and Waterproofing Manual” third edition.
- E. Sheet Metal and Air Conditioning Contractor’s National Association (SMACNA) – Architectural Sheet Metal Manual.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Manufacturer’s data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation method.
- C. Shop Drawings:
  - 1. Indicate material profile, dimensions, jointing pattern, jointing details, fastening methods, flashing, termination, and installation details.
  - 2. Show the layout of wall sections, attachment, joint details, trim flashing, accessories and air infiltration seals.
  - 3. Show thickness of treated wood nailers and substrate.
- D. Design Data:
  - 1. Submit manufacturer’s certification that product supplied meets Factory Mutual Research Corporation’s (FMRC) requirements for Roof Perimeter Flashing for use in Zone 1 and Zone 2 Windstorm Resistance Areas as defined in FME & R Loss Prevention Data Sheet 1-7 and 1-49 design recommendations, and meets the wind resistance requirements specified.
  - 2. Certify that perimeter metal edge systems furnished meet the specified design pressures as tested using ANSI/SPRI ES-1-98 test method RE-2 or RE-3 test methodology.
  - 3. Certify that membrane attachment by perimeter edge systems exceeds 100 lb/ft of force as tested by ANSI/SPRI ES-1-98 test method RE-1.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and pattern.

1.5 QUALITY ASSURANCE

- A. Installer qualifications: Companies specializing in sheet metal work with 5 years documented experience.



## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Materials shall be delivered with identification labels, warnings and storage recommendations.
- D. Materials shall be stored in a clean, dry location prior to installation to prevent any damage to the contents. Store materials off the ground and protect from damage and deterioration as required by the material manufacturer.
- E. Handle materials to prevent damage to their surfaces, edges and ends of metal items. Damaged material shall be rejected and immediately removed from the site.

## 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## 1.8 WARRANTY

- A. Warranty Certification: Installing contractor shall certify that sheet metal work has been installed per National Sheet Metal System's printed details and specifications.
- B. Manufacturer warrants sheet metal fabrications are warranted to be free of defects in material and workmanship for a period of five (5) years from date of shipment.
- C. Provide manufacturer's Twenty (20) year finish warranty for standard coil-coated Kynar 500 colors against peeling, chalking, fading, checking and crazing, commencing upon date of final completion.
- D. No other warranties either expressed or implied are acceptable unless so stated in writing.

# PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: McElory Metal, PO Box 1148, Shreveport, LA 71163, Toll free 800-950-6532.
- B. Other manufacturer's as approved by the Architect.

## 2.2 ROOF EDGE SYSTEMS

- A. Provide flashing system which meets the criteria recommended by Factory Mutual Research Corporation's (FRMC) requirements for Roof Perimeter Flashing for use in Zone 1 and Zone 2 Windstorm Resistance Areas as defined in FME & R Loss Prevention Data Sheet 1-7 and 1-49.
- B. Accessories:
  - 1. Closure Cleat.
  - 2. Custom Fabrications as shown on details.
- C. Accessories to be Fabricated from:
  - 1. 26 ga. Sheet Steel minimum.
- D. Finish:
  - 1. Kynar 500/Hylar 5000 from manufacturer's standard coil-coated colors.
    - a. Color – As determined by District representative.

## 2.3 METAL ROOF FLASHING & TRIM

- A. Profile: As indicated on Roof Manufacturer's standard details.
  - 1. Pitch Break.
  - 2. Valley Flashing.

3. Peak Flashing.
  4. Ridge/Hip Flashing.
  5. Eave Flashing.
  6. Outside Corner Flashing.
  7. Inside Corner Flashing.
  8. Material and Finish: 26 ga. Steel galvanneal/paint grip.
- B. Steel Finish:
1. Prefinished steel with Kynar 500/Hylar 5000 from manufacturer's standard colors.

## 2.4 MATERIALS

- A. Prefinished Zinc-Coated Steel: Hot-dip galvanized steel, commercial quality A1 S1 G90 extra smooth, primed on both sides and finished on 1 side with 70 percent Kynar 500 based fluorocarbon coating of minimum 0.70 mils total dry film thickness.
1. Strippable coating: Shop-applied liquid to front side of pre-finished metal to protect finish during fabrication, shipment, and field handling.
- B. Prefinished Aluminum Sheet: ASTM B 209, alloy 3003, coil-coated, 70 percent Kynar based fluorocarbon coating of minimum 0.70 mils total dry film thickness.

## 2.5 FABRICATION

- A. General Metal Fabrication: Shop-fabricate work to the greatest extent possible. Comply with details indicated on Drawings, and with applicable requirements of SMACNA. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
- B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. Form seams and solder tin edges to be seamed.
- C. Expansion and Contraction:
1. Provide for thermal expansion and contraction, and building movement in completed work, without over-stressing the material, breaking connections, or producing wrinkles and distortion in finished surfaces. Make watertight and weather-resistive.
  2. Where subject to thermal expansion and contraction, attach members with clips to permit movement without damage, or provide slotted or oversize holes with washers only, as acceptable to Architect.
  3. Make lock seam work flat and true to line, and sweat full of solder, except where installed to permit expansion and contraction.
    - a. Lap flat lock seams and soldered lap seams according to pitch, but in no case less than 3 inches. Make seams in direction of flow.
- D. Sealant Joints: Where movable, non-expansion type joints are indicated, or required for proper performance of work, form metal to provide for proper installation of sealant per SMACNA standards.
- E. Metal Separation: Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with bituminous coatings or other permanent separation as recommended by manufacturer.
- F. Accessories:
1. Factory assemblies shall be furnished to maintain watertight integrity.
  2. Provide matching accessories or other special fabrications from the manufacturer; color to match specified profile unless noted otherwise.
- G. Fascia/flashings sections furnished with strippable protective vinyl masking shall have film removed immediately before installation to prevent damage to the coating if left exposed to the ultra-violet rays of sunlight.

## **PART 3        EXECUTION**

### **3.1        EXAMINATION**

- A.        Do not begin installation until substrates have been properly prepared.
- B.        If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.2        PREPARATION**

- A.        Clean surfaces thoroughly prior to installation.
- B.        Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.3        INSTALLATION**

- A.        Install in accordance with manufacturer's instructions.
- B.        Except as otherwise indicated, comply with SMACNA recommendations.
- C.        Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units. Conceal fasteners wherever possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather-restive.
- D.        Strictly follow the material manufacturer's printed installation requirements.
- E.        Completed work shall be true to line without buckling, creasing, warp or wind in finished surfaces. "Oil-canning" surfaces are not acceptable.
- F.        Isolate dissimilar metals, masonry or concrete from metals using bituminous paint, tape or slip-sheet. Use gasketed fasteners where required to prevent corrosive actions.
- G.        Allow sufficient clearances for expansion and contraction of linear metal components. Secure metal using continuous cleats, clips and fasteners as required by the system. No exposed face fastening shall be accepted.

### **3.4        PROTECTION**

- A.        Protect installed products until completion of project.
- B.        Maintain prefinished surfaces in undamaged condition until date of final completion. Repair or replace damaged components, any touch-up to be indistinguishable from undamaged surface/finish.
- C.        Upon completion of work, a final inspection by the owner's representative shall be made. Any necessary corrective actions will be noted and the installing contractor shall make corrections within five (5) working days. Upon acceptance of the project, any applicable warranties shall be presented to the owner's representative.

**END OF SECTION**

**SHEET METAL ROOFING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Pre-finished steel sheet roofing, associated flashings.
- B. Counter flashings.
- C. Snow guards.

**1.2 RELATED SECTIONS**

- A. Section 07900 - Joint Sealers.

**1.3 REFERENCES**

- A. AAMA 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
- B. AAMA 605.2 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- C. ASTM A526/A526M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.

**1.4 SUBMITTALS FOR REVIEW**

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations and installation details.
- C. Product Data: Provide data on metal types, finishes and characteristics.

**1.5 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements, except as otherwise noted.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal roof installations with minimum four years experience.

**1.6 DELIVERY, STORAGE, AND PROTECTION**

- A. Section 01600 - Material and Equipment: Transport, handle, store, and protect.
- B. Stack material to prevent twisting, bending or abrasion and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials that may cause discoloration or staining.

**1.7 WARRANTY**

- A. Section 01700 - Contract Closeout. 01740 - Warranties.

## **PART 2        PRODUCTS**

### **2.1        METAL WALL AND ROOF PANELS**

- A.        Manufacturer: McElroy Metal, Inc.
  - 1.        Contact: 1500 Hamilton Road, Bossier City, LA 71111; Telephone (800) 950-6531, (318) 747-8000; Fax (318) 747-8059; Email [marketing@mcelroymetal.com](mailto:marketing@mcelroymetal.com); website [www.mcelroymetal.com](http://www.mcelroymetal.com)
  - 2.        Proprietary products: McElroy Preformed Roof Panels.
- B.        Or Equal.

### **2.2        MANUFACTURED UNITS**

- A.        McElroy Max-Rib Panel
  - 1.        Profile: Major longitudinal ribs 3/4" (45 mm) deep, spaced 9" (229 mm) on center; minor longitudinal ribs centered between major ribs.
  - 2.        Size: 36" (914 mm) cover width.
  - 3.        Material Galvalume steel sheet conforming to ASTM A792, AZ55 coating; 26 gauge sheet thickness.
  - 4.        Finish: Galvalume Substrate with Kynar 500 coating.
    - a.        Color: Selected from full range of manufacturer's standard colors.
- B.        Trim:
  - 1.        Manufacturer's standard 26 gauge sheet metal matching panel material and finish, break-formed, to profiles indicated on drawings, and including, but not limited to:
    - a.        Copings.
    - b.        Gravel stops.
    - c.        Gutters and downspouts.
    - d.        Termination and transition strips.
  - 2.        Color: Match panel finish.
  - 3.        Color: Selected from full range of manufacturer's standard color.
- C.        Clips and Fasteners: Supply items required for installation of panels in accordance with manufacturer's installation instructions and other indicated items; supply galvanized clips and fasteners.

### **2.3        ACCESSORIES**

- A.        Fasteners: The steel panels shall be fastened to building framing by plated steel sharp point screws with zinc/.aluminum/cast nonferrous alloy hex washer heads pre-assembled with aluminum bond seal washers, which cannot red rust and are compatible with steel panel. Woodzac by Construction Fasteners, Inc., or equal are acceptable.
- B.        Snow Guards:
  - 1.        Design Requirements: Continuous linear roof snow retention system along front of building should have a minimum performance of 500# per lineal foot of bar without deflection. Connection must be used at every roof seam.
  - 2.        Bar: 16 ga. galvanized steel with Kynar 500 finish. Snow guard bar color to match metal roof or as selected by Architect.
  - 3.        Connection: Stainless steel U- Bracket with stainless steel screws.
  - 4.        Substrate Below Roof Panel: 2-Ply purlin at eave attachment line or double stagger line.
  - 5.        Quality Assurance: 5-years
- C.        Warranty:
  - 1.        Max Rib Steel Panels:
    - a.        30 years against crack, peel, blister, or flake of paint coating

- b. 40 years against Chalk in excess of 8 per ASTM D-4214 Method D659
  - c. 40 years against change of color in excess of 5 per ASTM D-2244
- D. Trim and Flashing: 0.0158" minimum thickness steel on gables, ridge, corners, base with same prefinished paint, Kynar 500. Color selected from standard color samples.
- E. Closure Strips: 1" wide closed-cell linked expanded polyurethane, to match panel corrugation.

## 2.4 FABRICATION

- A. Form sections true to shape, accurate in size, square and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, minimum 3" wide, interlockable with sheet.
- C. Fabricate starter strips of same material as sheet, intermittent to minimum 3 inches wide, interlockable with sheet.
- D. Form pieces in longest practical lengths.
- E. Hem exposed edges on underside 1/2", miter and seam corners.
- F. Form material with standing seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- I. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.
- J. Fabricate snow guards in accordance with SMACNA Plate.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves or projections, properly sloped to drains, valleys and/or eaves.
- B. Verify deck is dry and free of snow or ice.
- C. Verify correct placement of wood nailers [and insulation positioning between nailers].
- D. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set; reglets are in place and nailing strips located.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.

### 3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- C. Back paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mils.

### 3.3 INSTALLATION - FLASHINGS

- A. Conform to SMACNA details.
- B. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- C. Cleat and seam all joints.
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place. Make corners square with surfaces true and straight in planes and lines accurate to profiles.
- F. Seal metal joints watertight.

### 3.4 PROTECTION OF FINISHED WORK

- A. Section 01700 - Contract Closeout: Protecting installed work.

- B. Do not permit traffic over unprotected roof surface.

**END OF SECTION**

**GUTTERS AND DOWNSPOUTS**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Pre-finished continuous aluminum gutters and downspouts.
- B. Precast concrete splash pads.

1.2 RELATED SECTIONS

- A. Section 09900 - Painting: Field painting of metal surfaces.

1.3 REFERENCES

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.4 DESIGN REQUIREMENTS

- A. Conform to SMACNA Manual CDA Handbook for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.5 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations and installation details.
- C. Samples: Submit two samples, 12 inches long illustrating component design, finish, color and configuration.

1.6 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01600 - Material and Equipment: Transport, handle, store and protect.
- B. Stack material to prevent twisting, bending or abrasion and to provide ventilation. Slope to drain.
- C. Prevent contact with materials during storage that may cause discoloration, staining or damage.

1.7 PROJECT CONDITIONS

- A. Section 01039 - Coordination and Meetings.
- B. Coordinate the work with downspout discharge pipe inlet.

**PART 2 PRODUCTS**

2.1 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209; 0.032 inch thick; plain finish shop pre-coated with acrylic coating; color as selected from manufacturer's standard.

2.2 COMPONENTS

- A. Gutters: SMACNA Square style profile.
- B. Connectors: Furnish required connector pieces for PVC (Polyvinyl Chloride) components.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
  - 1. Anchoring Devices: Type recommended by fabricator.



- 2. Gutter Supports: Straps, screws and ferrules.
- 3. Downspout Supports: Straps.
- D. Fasteners: Aluminum. Same material and finish as gutters and downspouts, with soft neoprene washers.

### 2.3 ACCESSORIES

- A. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3,000 p.s.i. at 28 days, with minimum 5 percent air entrainment.
- B. Downspout Boots: Plastic.

### 2.4 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

### 2.5 FACTORY FINISHING

- A. Modified silicone polyester coating: Baked enamel system conforming to AAMA 603.8.
- B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
- B. Verify that contact surfaces are ready to receive work.

### 3.2 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

### 3.3 INSTALLATION

- A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions.
- B. Slope gutters 1/8 inch per foot
- C. Connect downspouts to downspout boots or shoes at 8 inches above grade or into storm sewer system. Seal connection watertight.
- D. Set splash pads under downspouts.

**END OF SECTION**

**JOINT SEALERS**

**PART 1        GENERAL**

**1.1        SECTION INCLUDES**

- A.        Sealants and joint backing.
- B.        Precompressed foam sealers.
- C.        Hollow gaskets.

**1.2        REFERENCES**

- A.        ASTM C834 - Standard Specification for Latex Sealing Compounds.
- B.        ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- C.        ASTM C1193 - Standard Guide for Use of Joint Sealants.
- D.        ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
- E.        ASTM D1565 - Standard Specification for Flexible Cellular Materials -Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).
- F.        ASTM D1667 - Standard Specification for Flexible Cellular Materials -Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).

**1.3        QUALITY ASSURANCE**

- A.        Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B.        Applicator Qualifications: Company specializing in performing the work of this section and approved by manufacturer.

**1.4        ENVIRONMENTAL REQUIREMENTS**

- A.        Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

**1.5        COORDINATION**

- A.        Section 01039 - Coordination and Meetings: Coordination requirements.
- B.        Coordinate the work with all sections referencing this section.

**1.6        WARRANTY**

- A.        Section 01700 - Warranties.
- B.        Correct defective work within a five-year period after Date of Substantial Completion.
- C.        Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and exhibit loss of adhesion or cohesion or do not cure.

**1.7        SEALANTS**

- A.        Type I - General Purpose Exterior Sealant: Polyurethane or Polysulfide; ASTM C920, Grade NS, Class 25, Uses M, G and A; single or multi- component.
  - 1.        Standard colors matching finished surfaces.
- B.        Type II - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent:

1. Face color: Gray.
  2. Size as required providing watertight seal when installed.
  3. Provide product recommended by manufacturer for traffic-bearing use.
  4. Applications: Use for:
    - a. Exterior wall expansion joints
    - b. Paving surface joints
    - c. Set in floor components
- C. Type III - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, non-drying, non-skinning, non-curing.
1. Applications: Use for:
    - a. Concealed sealant bead in sheet metal work.
    - b. Concealed sealant bead in siding overlaps.
- D. Type IV - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, M and A; single or multi-] component.
1. Gray color.
  2. Applications: Use for:
    - a. Joints in sidewalks and vehicular paving.

## **PART 2 PRODUCTS**

### **2.1 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

### **3.2 PREPARATION**

- A. Remove loose materials and foreign matter that might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfiguration.

### **3.3 INSTALLATION**

- A. Perform installation in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges and sags.

- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.
- H. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- I. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

#### 3.4 CLEANING

- A. Clean adjacent soiled surfaces.

#### 3.5 PROTECTION OF FINISHED WORK

- A. Protect sealants until cured.

**END OF SECTION**

## **09900**

### **PAINTING**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints, stains, varnishes and other coatings.

##### **1.2 RELATED SECTIONS**

- A. Section 05500 - Metal Fabrications: Shop primed items.
- B. Section 04300 – Unit Masonry System.

##### **1.3 REFERENCES**

- A. ASTM D16 - Standard Terminology Relating to Paint, Varnish, Lacquer and Related Products.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
- C. NACE (National Association of Corrosion Engineers) - Industrial Maintenance Painting.
- D. NPCA - Guide to U.S. Government Paint Specifications; National Paint and Coatings Association.
- E. PDCA - Architectural Specifications Manual; Painting and Decorating Contractors of America.
- F. SSPC - Steel Structures Painting Manual; Steel Structures Painting Council.

##### **1.4 DEFINITIONS**

- A. Conform to ASTM D16 for interpretation of terms used in this section.

##### **1.5 SUBMITTALS FOR REVIEW**

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Samples:
  - 1. Submit two paper chip samples, 2 x 4 inches in size illustrating range of colors and textures available for each surface finishing product scheduled.

##### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

##### **1.7 DELIVERY, STORAGE AND PROTECTION**

- A. Section 01600 - Material and Equipment: Transport, handle, store and protect products.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation and instructions for mixing and reducing.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Material and Equipment: Environmental conditions affecting products on site.
- B. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior, unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## 1.9 PROJECT CONDITIONS

- A. Section 01039 - Coordination and Meetings.
- B. Sequence application to the following:
  - 1. Do not apply finish coats until paintable sealant is applied.
  - 2. Back prime wood trim before installation of trim.

## 1.10 EXTRA MATERIALS

- A. Section 01730 - Operation and Maintenance Data.
- B. Supply 1 gallons of each color, type and surface texture; store where directed.
- C. Label each container with color, type, texture and room locations in addition to the manufacturer's label.

# **PART 2 PRODUCTS**

## 2.1 MATERIALS

- A. Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
  - 1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
  - 2. For good flow and brushing properties.
  - 3. Capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

## 2.2 FINISHES

- A. Refer to finish schedule on drawings for surface finish.

## 2.3 BRAND OF PAINT

- A. Sherwin-Williams or equal.

# **PART 3 EXECUTION**

## 3.1 EXAMINATION

- A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting Work.

- B. Verify that surfaces and substrate conditions are ready to receive Work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  - 1. Plaster and Gypsum Wallboard: 12 percent.
  - 2. Masonry, Concrete and Concrete Unit Masonry: 12%.
  - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 5. Concrete Floors: 8 percent.

### 3.2 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces that affect work of this section.
- C. Marks: Seal with shellac those that may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powdered and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow it to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow it to dry.
- F. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt and rust. Where heavy coatings of scale are evident, remove by [hand] [power tool] wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts and nuts are similarly cleaned. Spot prime paint after repairs.
- G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with a solvent. Prime paint bare steel surfaces.
- H. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

### 3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- D. Sand wood surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- G. Prime concealed surfaces of interior woodwork with primer paint.
- H. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.

### 3.4 CLEANING

- A. Collect waste material that may constitute a fire hazard, place in closed metal containers and remove daily from site.

### 3.5 SCHEDULE - EXTERIOR SURFACES

- A. Steel - Unprimed:
  - 1. One coat of alkyd primer.
  - 2. Two coats of alkyd enamel, gloss.
- B. Steel - Shop Primed:
  - 1. Touch-up with zinc chromate primer.
  - 2. Two coats of alkyd enamel, gloss.
- C. Steel - Galvanized:
  - 1. One coat galvanize primer.
  - 2. Two coats of alkyd enamel, gloss.
- D. Concrete, Concrete Block:
  - 1. One coat of primer sealer latex.
  - 2. Two coats of alkyd, semi-gloss.

**END OF SECTION**



**PLUMBING SYSTEMS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Water piping.
  - 2. Sanitary drainage.
  - 3. Condensate piping.
  - 4. Testing.
- B. Comply with other Division 15 Sections, as applicable. Refer to other Divisions for coordination of work.

**1.2 SUBMITTALS**

- A. Make submittals for all products specified in the specification.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Water Piping Above Grade, Type "L" hard drawn, seamless copper water tube, ASTM B88 and Federal Specification WW-T-799. Joined with wrought copper pressure fittings, ANSI B16.22. Make joints using "lead free" solder and a non-corrosive paste-type flux. Core solder is not allowed. Solder will be solid string or wire type. Where soldered copper piping is connected to threaded brass piping, use a cast brass adaptor.
- B. Water Piping Below Grade, Type "K" hard drawn, seamless copper water tube, ASTM B88 and Federal Specification WW-T-799. Joined with wrought copper pressure fittings, ANSI B16.22. Make joints using "lead free" solder and a non-corrosive paste-type flux. Core solder is not allowed. Solder will be solid string or wire type. Where soldered copper piping is connected to threaded brass piping, use a cast brass adaptor.
- C. Make piping connections to fixtures and equipment with chrome-plated seamless brass tube, ASTM B-125 and Federal Specification WW-T0791. No ferrous piping or materials are allowed in water piping smaller than 4 inches.

**2.2 SANITARY DRAINAGE**

- A. Sanitary Drainage lines (Soil, Waste and Vent): Cast iron soil pipe and fittings, coating inside and outside, ASTM A74 and Federal Specification WW-P-401. Label with Cast Iron Soil Pipe Institutes' "Mark of Quality and Permanence". Weights of pipe are required by code for location and duty. Joints shall be fabricated by use of "Push-On" type gasketed joints (above or below ground) or "No-Hub" mechanical joints (above ground only). Where permitted by local codes, PVC-DWV Plastic Schedule 40, NSF Seal CS-272 may be used for sanitary drainage pipes (soil, waste, and vent), with solvent-welded joints.

## **PART 3        EXECUTION**

### **3.1        PIPING INSTALLATION**

- A.        Install piping neatly and parallel with or perpendicular to lines of the structure. Install pipe hangers to maintain accurately aligned piping systems, adequately supported both laterally and vertically. Install horizontal soil, waste, and vent pipe with a grade of 1/4" per foot where possible and not less than 1/8" per foot. Where practicable, connect two or more vents together and extend as one vent through roof. Make vent connections to stacks by appropriate use of 45 wyes, long sweep quarter bends, sixth, eighth or sixteenth bends, except that sanitary tees may be used on the vertical stacks.
- B.        Extend condensate drain piping from units with condensate discharge.
- C.        Install drains at all low points and vents at high points in water distribution system.

### **3.2        PIPING**

- A.        Refer to Section 15700 for insulation requirements.

### **3.3        PIPE TESTS**

- A.        Test water piping before installing equipment and before insulation is applied, using specified methods and conditions. Subject piping to test for not less than 24 hours under inspection by the Engineer. Make necessary replacements and repairs and repeat tests until entire system is accepted as satisfactory. Work includes testing equipment. After installation of equipment, operate systems; clean out scale, dirt, oil, waste and foreign matter, and correct additional leaks. Test underground piping prior to backfilling.
- B.        Test plumbing drainage systems under 10 foot static head. Test water systems under 150 PSIG hydrostatic pressure.
- C.        Flush system thoroughly of dirt and foreign matter, then fill with water treated with 50 ppm of chlorine. During filling process, open valves and faucets several times to assure treatment of entire system. Leave treated water in system for 24 hours after which time system may be flushed; if residual chlorine is not less than 10 ppm, repeat flushing. After sterilization, receive approval by regulatory agency on samples of water in system.

**END OF SECTION**